



Dielectric Characterization

Manufacturing Technologies

The Manufacturing Science and Technology Center provides a broad range of dielectric characterization for electroceramics either in bulk or thin film form. Special emphasis is placed on the dielectric characterization on ferroelectrics, varistor ceramics and thick film materials. Quick system integration, combined with our expertise in data acquisition, enables us to perform specialized tasks beyond basic dielectric characterization within limited time constraints.

Capabilities

- Perform basic dielectric characterization as a function of temperature, frequency, and dc bias
- Determine the ac and dc conductivity, characteristics of polarization reversal, field-induced electromechanical responses, and piezoelectric coefficients
- Measure the current-voltage characteristics for varistor materials
- Perform unique system integration and data acquisition for material characterization
- Correlate ceramic performance to processing, microstructure and electrical properties

Resources

- Precision Inductance/Capacitance/Resistance Meter
- Impedance/Gain-Phase Analysis
- Polarization Hysteresis Tester
- High Power Pulse Generator
- Piezoelectric Meter
- Environmental Test Chamber
- Data Acquisition System

Accomplishments

- Established a basic understanding of the hot pole cracking problem experienced in current stack production. An unusual field-enhanced strain was identified during the high temperature to low temperature rhombohedral phase transformation. This unusual behavior contributed to low production yields in the past few years. A no-cost hot poling process modification has improved our production yield from 68% to greater than 92%.
- Developed a correlation between processing, microstructure and electric properties of buried resistors in low temperature co-fired ceramics. Expertise in

this area is expanding for the development of integrated bias resistor applications.

- Established a web-based database for the chem-prep 95/5 PZT ferroelectric ceramics. The database consists of processing, microstructure, and dielectric property information to aid overall voltage bar component development efforts.
- Developing non-destructive crack detection techniques for active ceramic components.

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